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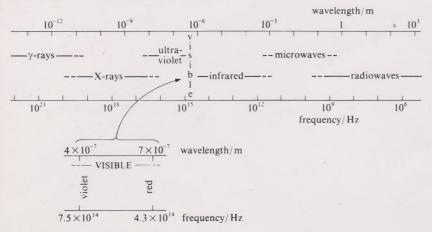
Unit I Science and the planet Earth

Unit 2
Measuring the Solar System



USEFUL INFORMATION FOR THE PHYSICS AND GENERAL SCIENCE UNITS

ELECTROMAGNETIC SPECTRUM



PHYSICAL CONSTANTS

Symbol	Quantity	Approximate value
G	gravitational constant	$6.672 \times 10^{-11} \text{N} \text{m}^2 \text{kg}^{-2}$
C	speed of light in a vacuum	$2.998 \times 10^8 \mathrm{ms^{-1}}$
h	Planck's constant	$6.626 \times 10^{-34} \mathrm{J}\mathrm{s}$
е .	magnitude of the charge of the electron	$1.602 \times 10^{-19} \mathrm{C}$
m _e	mass of the electron	$9.110 \times 10^{-31} \mathrm{kg}$
$m_{\rm n}$	mass of the neutron	$1.675 \times 10^{-27} \mathrm{kg}$
$m_{\rm p}$	mass of the proton	$1.673 \times 10^{-27} \mathrm{kg}$

USEFUL QUANTITIES AND CONVERSIONS

 $\pi \approx 3.142$ 1 mile ≈ 1.609 km

1 kilometre (km) ≈ 0.6214 mile

1 inch = 2.54 cm

1 centimetre (cm) ≈ 0.3937 inch

1 kilocalorie ≈ 4 187 J

1 electronvolt (eV) $\approx 1.602 \times 10^{-19} \,\mathrm{J}$

1 radian ≈ 57.296 degrees

1 degree ≈ 0.01745 radian

 $1 \text{ GeV}/c^2 \approx 1.783 \times 10^{-27} \text{ kg}$

Earth radius (equatorial) $\approx 6.38 \times 10^6 \,\mathrm{m}$

circumference of the Earth (distance round the Equator) $\approx 4.01 \times 10^7 \,\text{m}$

radius of the Moon $\approx 1.74 \times 10^6 \, \text{m}$

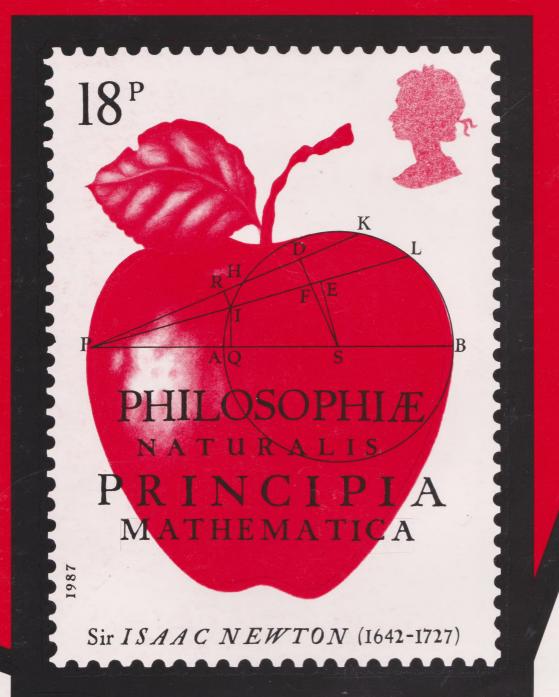
radius of the Sun $\approx 6.96 \times 10^8 \,\mathrm{m}$

Earth–Sun distance (i.e. orbital radius of the Earth) $\approx 1.50 \times 10^{11}$ m

Earth–Moon distance (i.e. orbital radius of the Moon) $\approx 3.84 \times 10^8$ m

SIO2 UNITS

4			
		23	
	Keismology and the Earth's		
7-8	Plate tectonics: a revolution in	.25	
		28	
	. Exergy	27	
	Modelling the behaviour of light		
11-12			
	Chemical reactions and the		

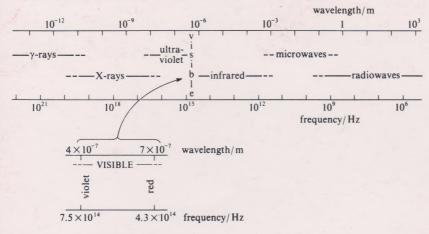


Unit 3
Motion under gravity

Unit 4
Practical work in science

USEFUL INFORMATION FOR THE PHYSICS AND GENERAL SCIENCE UNITS

ELECTROMAGNETIC SPECTRUM



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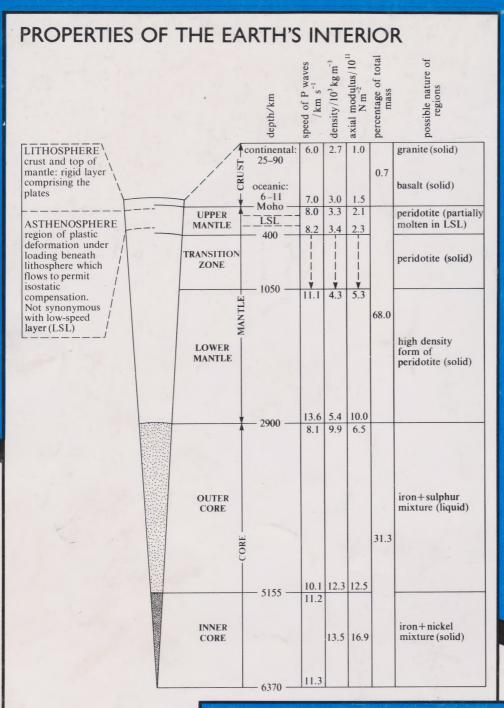
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			The state of the s
	Science and the planet Earth	19	Life and evolution
2			Inheritance and cell division
	Motion under gravity		Gener and evolution
4			
	seismology and the Earth's	24	DNA: molecular aspects of
	Plate tectonics: a revolution in	25	
		26	
		27	Earth materials and processes
	Modelling the behaviour of light	28-29	Geological time and Earth
	Chemical reactions and the		Quantum mechanics: an
	Periodic Table		
	Chemical equilibrium		
	Chemical energetics		
	The chemistry of carbon		The search for fundamental

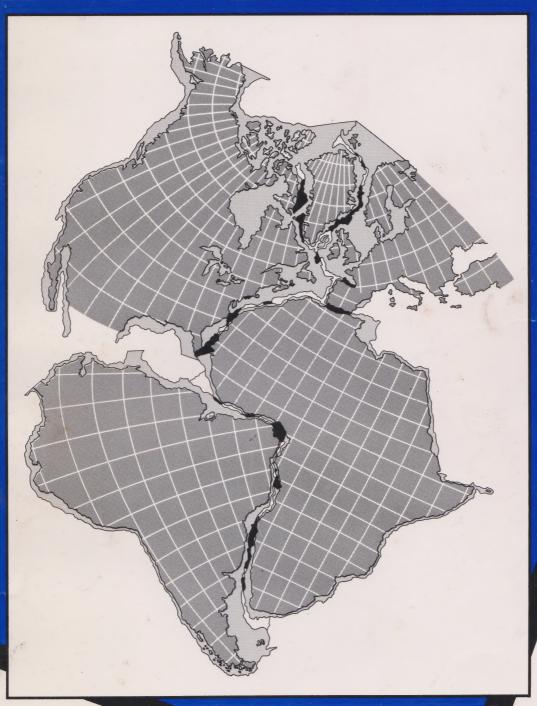


Units 5-6
Into the Earth: earthquakes, seismology and the Earth's magnetism

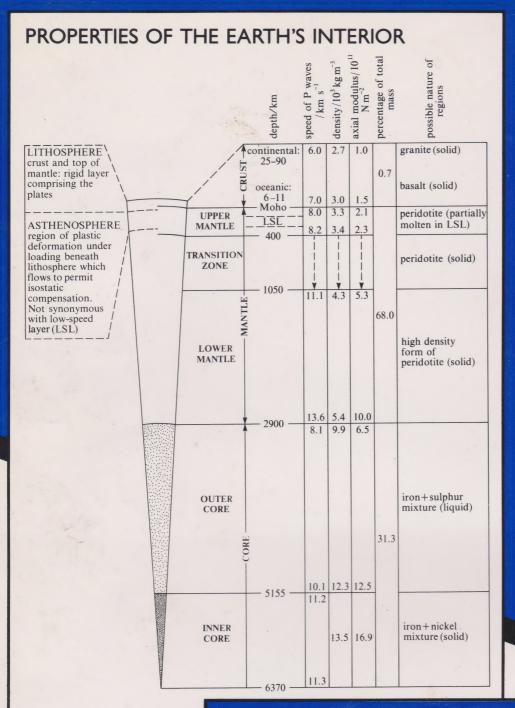


SIO2 UNITS

	Science and the planet Earth	19	Life and evolution
2	Measuring the Solar System	20	Inheritance and cell division
3	Motion under gravity	- 21	Genes and evolution
4	Practical work in science	22	Biochemistry
5–6	Into the Earth: earthquakes,	23	Physiology
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13-14		30	Quantum mechanics: an
	Periodic Table		introduction
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16	Chemical energetics		nuclei
17-18		32	The search for fundamental
	compounds		particles
	compounds		particles

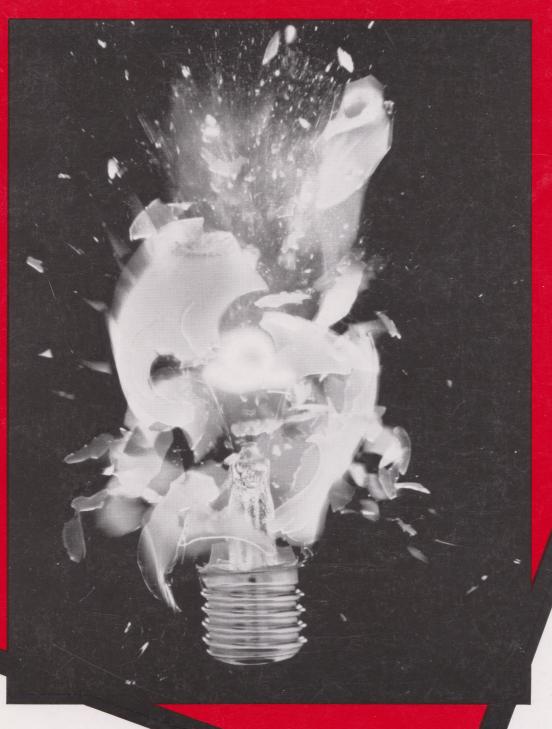


Units 7–8
Plate tectonics:
a revolution in the Earth sciences



- Science and the planet Earth Measuring the Solar System Motion under gravity Practical work in science Into the Earth: earthquakes, seismology and the Earth's magnetism Plate tectonics: a revolution in the Earth sciences
- Energy Modelling the behaviour of light 10 Atomic structure 11-12
- 13-14 Chemical reactions and the Periodic Table Chemical equilibrium
- Chemical energetics 17-18 The chemistry of carbon compounds

- 19 Life and evolution
- Inheritance and cell division
- 20 21 Genes and evolution
- Biochemistry
- Physiology DNA: molecular aspects of 24
- genetics Ecology
- Biology reviewed
- Earth materials and processes
- Geological time and Earth history
- 30 Quantum mechanics: an introduction
- Quantum mechanics: atoms and
- The search for fundamental 32 particles

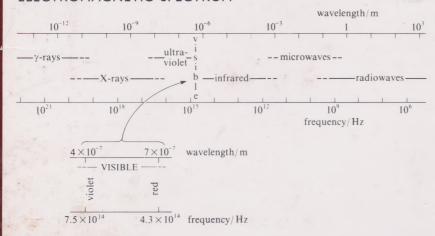


Unit 9 Energy

Unit 10 Modelling the behaviour of light

USEFUL INFORMATION FOR THE PHYSICS AND GENERAL SCIENCE UNITS

ELECTROMAGNETIC SPECTRUM



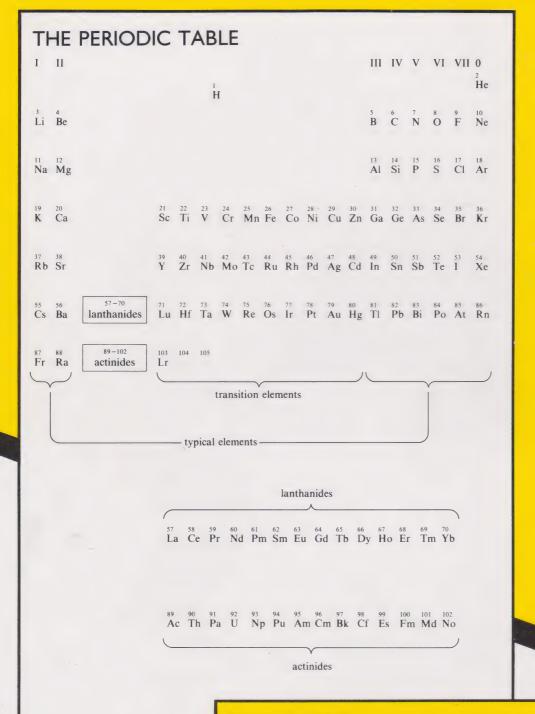
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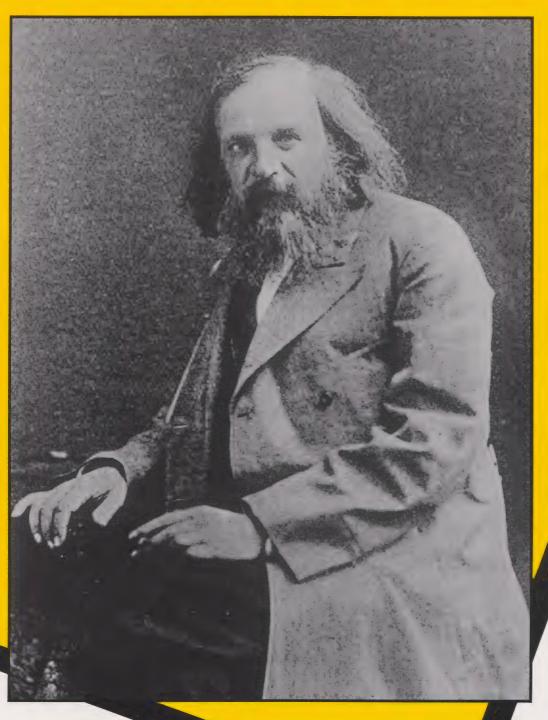


Units II-I2 Atomic structure

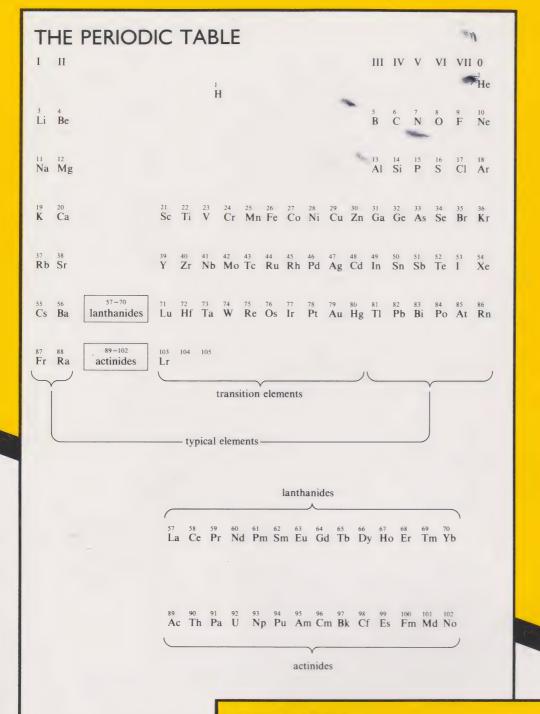


SI02 UNITS

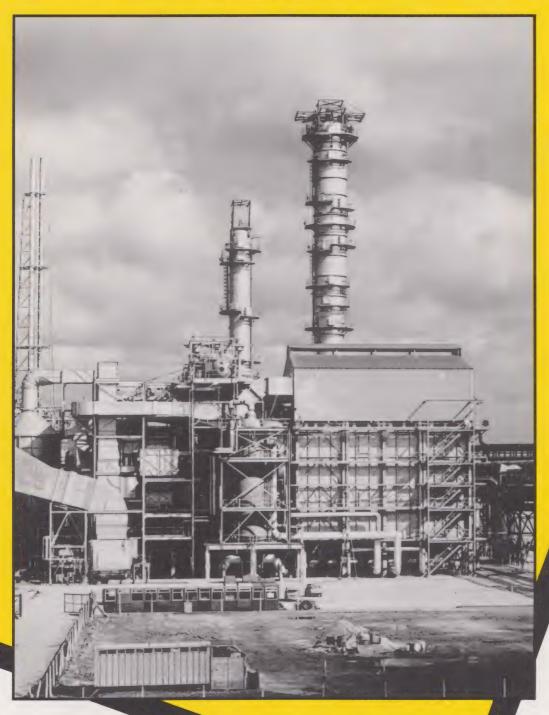
1	Science and the planet Earth	19	Life and evolution
2	Measuring the Solar System	20	Inheritance and cell division
3	Motion under gravity	21	Genes and evolution
4	Practical work in science	22	Biochemistry
56	Into the Earth: earthquakes,	23	Physiology
	seismology and the Earth's	24	DNA: molecular aspects of
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7–8	Plate tectonics: a revolution in	25	Ecology
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11-12	Atomic structure		history
13-14	Chemical reactions and the	30	Quantum mechanics: an
	Periodic Table		introduction
15	Chemical equilibrium	31	Quantum mechanics: atoms and
16	Chemical energetics		nuclei
17-18	The chemistry of carbon	32	The search for fundamental
	compounds		particles



Units 13-14 Chemical reactions and the Periodic Table

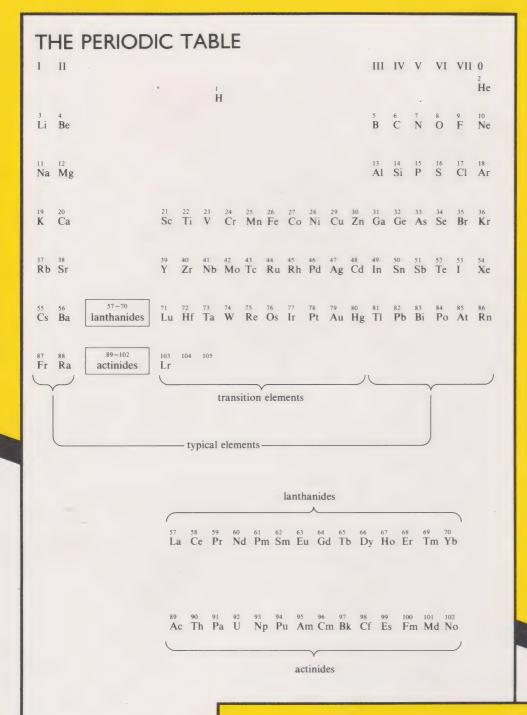


	Science and the planet Earth	19	Life and evolution
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	compounds		particles



Unit 15 Chemical equilibrium

Unit 16 Chemical energetics

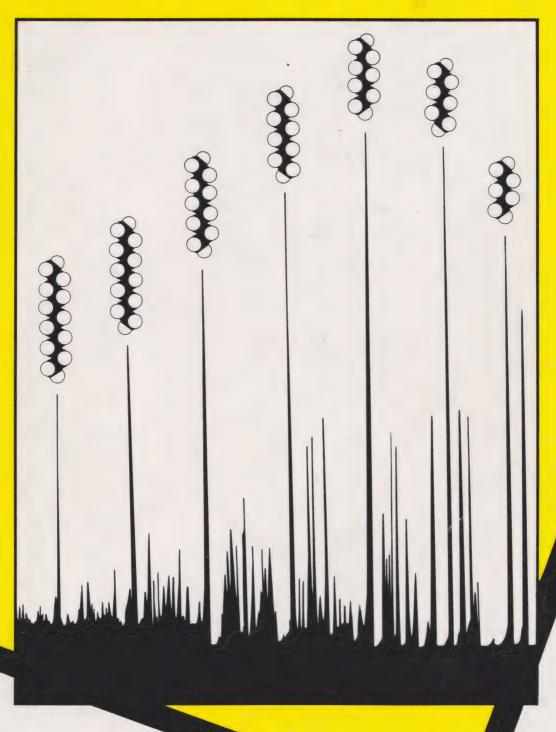


SI02 UNITS

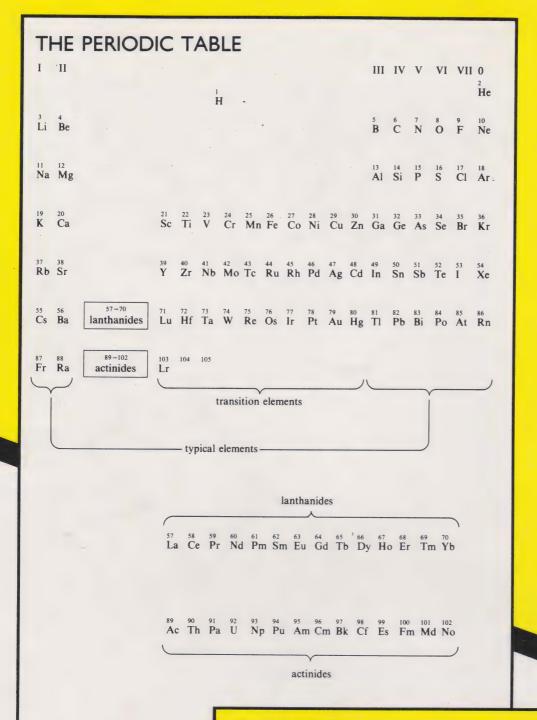
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17-18	The chemistry of carbon	32	The search for fundamental
	compounds		particles
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Units 17–18
The chemistry of carbon compounds



SIO2 UNITS

1	Science and the planet Earth	19	Life and evolution
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	compounds		particles



Unit 19 Life and evolution

Unit 20 Inheritance and cell division

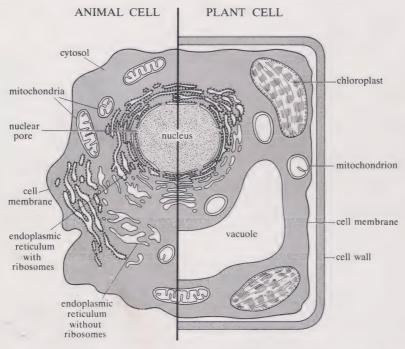
Unit 21 Genes and evolution

USEFUL INFORMATION FOR THE BIOLOGY UNITS: CHEMICALS, CELLS AND CLASSIFICATION

All cellular organisms contain these four biopolymers (made up of the monomers shown below).

Biopolymers: polysaccharides proteins DNA RNA
Monomers: monosaccharides amino acids deoxyribonucleotides ribonucleotides

All eukaryotic organisms have cells of the following generalized structure.



All living organisms can be divided into four kingdoms. The figures in brackets show the number of species (in thousands) in each subkingdom.

Animals	Plants	Fungi	Prokaryotes
sponges (4) unicells (40) multicells (1 000–2 000)	eukaryotic algae (20) true plants (330)	slime moulds (0.5) true fungi (100)	bacteria (1.6) blue-green bacteria (formerly termed blue- green algae) (1.5)

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Unit 22 Biochemistry

Unit 23 Physiology

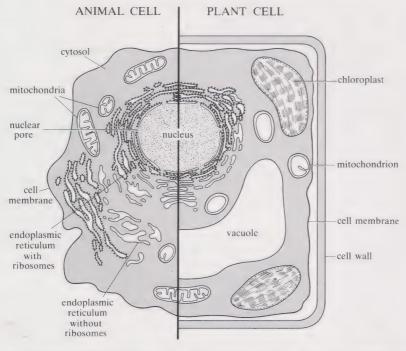
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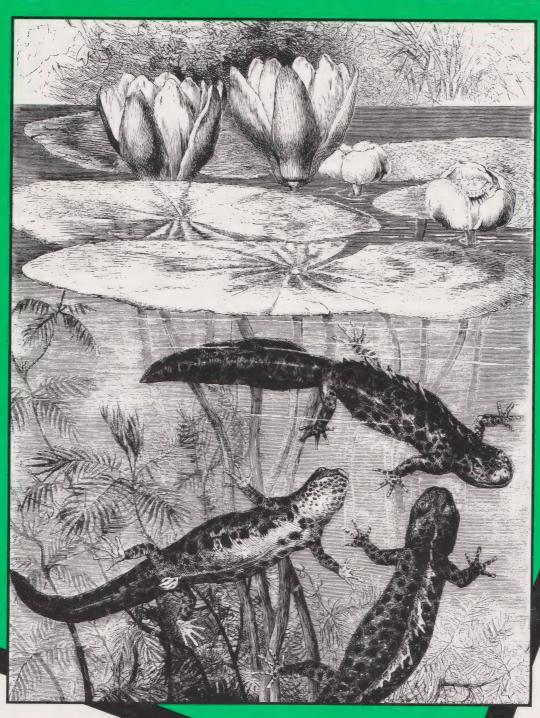


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SI02 UNITS

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17–18		32	The search for fundamental particles



Unit 24
DNA: molecular aspects of genetics

Unit 25 Ecology

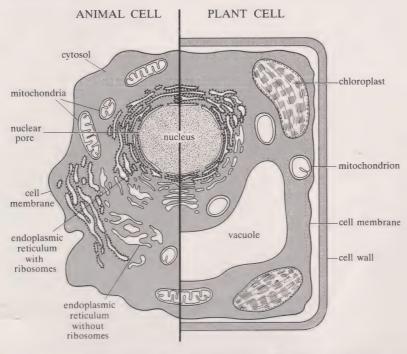
Unit 26 Biology reviewed

USEFUL INFORMATION FOR THE BIOLOGY UNITS: CHEMICALS, CELLS AND CLASSIFICATION

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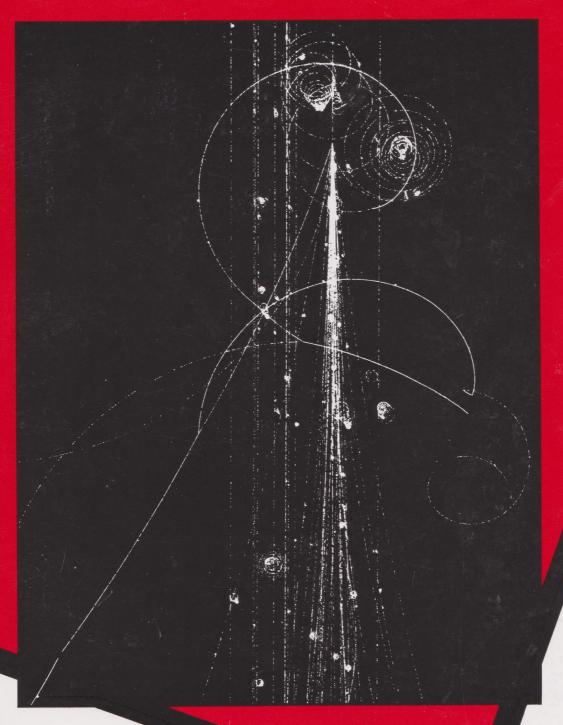
Unit 27
Earth materials and processes

Units 28 - 29
Geological time and Earth history

EARTH HISTORY AND STRATIGRAPHIC COLUMN

Т	RUE SCAL	E		EXPANDED SCA	LE
First appearance			Era	Period	Millions of years ago
	Cainozoic			Quaternary	2
mammals major coals	Mesozoic		Cainozoic	Tertiary	2
land plants	Palaeozoic	1			15
Metażoa				1.30	65
			M e	Cretaceous	
definite		1 1	S		145
eukaryotes			0 Z 0	Jurassic	143
		1	i		
			С	Triassic	215
1% atmospheric	P		7	Permian	250
oxygen level redbeds	e c			Carboniferous	285
	a m		P		360
	b r		l a e	Devonian	
stromatolites	i. a		o z	Silurian	410
	n		0		440 —
earliest life-forms			i c	Ordovician	
(prokaryotes)		,			505
<u>banded</u> ironstones				Cambrian	
					590
			Prec	am brian	390
core formation					4600 —

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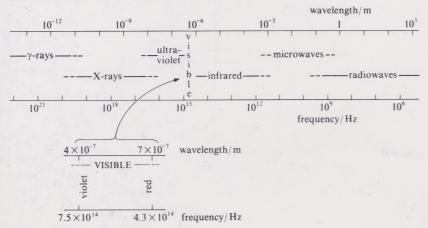
Unit 30
Quantum mechanics:
an introduction

Unit 31
Quantum mechanics:
atoms and nuclei

Unit 32
The search for fundamental particles

USEFUL INFORMATION FOR THE PHYSICS AND GENERAL SCIENCE UNITS

ELECTROMAGNETIC SPECTRUM



PHYSICAL CONSTANTS

1 degree ≈ 0.01745 radian

 $1 \text{ GeV}/c^2 \approx 1.783 \times 10^{-27} \text{ kg}$

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1 inch = 2.54 cm 1 centimetre (cm) ≈ 0.3937 inch	radius of the Moon $\approx 1.74 \times 10^6 \mathrm{m}$
1 kilocalorie $\approx 4187\mathrm{J}$	radius of the Sun $\approx 6.96 \times 10^8 \mathrm{m}$
1 electronvolt (eV) $\approx 1.602 \times 10^{-19} \text{J}$ 1 radian ≈ 57.296 degrees	Earth–Sun distance (i.e. orbital radius of the Earth) $\approx 1.50 \times 10^{11} \mathrm{m}$

Earth-Moon distance (i.e. orbital radius of the Moon) $\approx 3.84 \times 10^8 \,\mathrm{m}$

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